

Prescribed Fire

1. Donegan, K.K., L.S. Watrud, R.J. Seidler, S.P. Maggard, T. Shiroyama, L.A. Porteous and G. DiGiovanni. 2001. Soil and litter organisms in Pacific Northwest forests under different management practices. *Applied Soil Ecology* 18:159-175.

Keywords: planting operations
site preparation
prescribed fire
soil properties

Abstract: Soil and litter organisms were monitored for their response to different forest management practices. Litter and soil cores (0-10, 10-20 cm) were collected at approximately 8-week intervals over a 19-month period from a low elevation 110-140-year-old Douglas fir (*Pseudotsuga menziesii*) forest and adjacent 8-year-old clearcut in the Oregon Cascades, and from a high elevation 200-250-year-old Douglas fir forest and adjacent 5-year-old clearcut in the McKenzie River drainage. The low elevation clearcut had been broadcast burned and replanted with Douglas fir trees and a grass (*Dactylis* and *Lolium*)-legume (*Trifolium* and *Lotus*) mixture whereas the high elevation clearcut was not burned, large woody debris was left, and it was replanted with Douglas fir, Noble fir [*Abies procera*], Grand fir [*Abies grandis*], and western white pine [*Pinus monticola*]. The litter and soil cores were analysed for types of microarthropods and numbers of nematodes, fungi, culturable, aerobic bacteria, spore-forming bacteria, and chitin-degrading bacteria. Microbial community metabolic profiles, using the Biolog method, were also generated for the 0-10 cm soil samples. Populations of *Pseudomonas* spp. were analysed in the litter and soil samples using 16S rDNA fingerprints. Plant surveys were conducted to identify potential relationships of soil organisms to plant community composition. At both elevational field sites, there were significantly ($P < 0.05$) higher levels of nematodes and microarthropods in litter and soil in forest plots than in clear felled plots. Bacterial and fungal populations were also significantly higher in litter in forest plots than in clear felled plots at the high elevation site. In the litter and soil at the low elevation site and the soil at the high elevation site, however, microbial levels were higher in clear felled plots than in forest plots. The *Pseudomonas* spp. populations and the microbial community metabolic profiles in the 0-10 cm soil differed significantly between the forest and clear felled plots at the low elevation site but not at the high elevation site. At both elevational field sites, the plant cover (%) and plant density were significantly higher in clear felled plots than in forest plots. These observed differences in the population size and composition of organisms between mature forests and both low management and high management clearcuts demonstrated the impacts forest management practices may have on the soil ecosystem.

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2. Feller, M.C. 1988. Relationships between fuel properties and slashburning-induced nutrient losses. *Forest-Science* 34(4): 998-1015.

Keywords: site preparation
prescribed fire
soil properties

Abstract: The relations between slash load, slash and forest floor consumption variables, and species origin of slash (slash type) on one hand and nutrient (N, P, S, K, Na, Mg and Ca) losses to the atmosphere during slashburning on the other were studied by burning 50 plots, each 2.25 m² in area. The plots contained known amounts of slash materials derived from four major southwestern British Columbia tree species (Tsuga heterophylla, Thuja plicata, Chamaecyparis nootkatensis and Pseudotsuga menziesii) and were burned under different weather conditions. Nutrient losses (g/m²) decreased in the order N > Ca > S > K > Mg > P > Na and were generally within the range of such losses recorded for operational prescribed burns in western North America. Losses of all nutrients except Na were positively correlated with fuel consumption. Nitrogen and S exhibited the best correlations, whereas no correlations were found for Na. Of the fuel consumption variables considered, depth of forest floor consumed, then total slash consumption, were best correlated with nutrient loss. Losses of most nutrients generally increased with slash load and as slash type changed from Tsuga to Pseudotsuga to Thuja/Chamaecyparis. This was partly due to the effects of slash load and slash type on fuel consumption, and partly due to their effects on burning-caused changes in nutrient concn. in slash materials. The study suggests that nutrient losses to the atmosphere during operational slashburns can be minimized by minimizing forest floor and large diameter slash consumption during burning.

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3. Feller, M.C. 1990. Herbicide application followed by prescribed fire to convert a brushfield into a conifer plantation in south coastal B.C.: a combination of the initial effects of two treatments. B.C. Ministry of Forests FRDA Report 146. 40 p.

Keywords: site preparation
chemical preparation
prescribed fire
growth
tree/stand health
soil properties
stand conditions

Abstract: A field study was carried out in Pseudotsuga menziesii stands in British Columbia, Canada, to investigate the effects on vegetation of glyphosate applications in September 1987 or July 1988, followed by burning in October 1988. Results did only show slight differences between treatments.

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4. Haight, R.G. 1993a. The economics of Douglas-fir and red alder management with stochastic price trends. Canadian-Journal-of-Forest-Research 23(8): 1695-1703.

Keywords: planting operations
site preparation
prescribed fire
release treatments

chemical release
thinning
precommercial thinning
commercial thinning
tree/stand protection
economics

Abstract: A financial analysis of Douglas fir (*Pseudotsuga menziesii*) and red alder (*Alnus rubra*) management was conducted using yield projections from the Stand Projection Simulator for the Pacific Northwest region of the United States. The analysis included uncertainty in the price trends and stocking levels of both species following reforestation. Results from a case study in which Douglas fir price is likely to increase faster than red alder price show that (i) on more productive sites, greater regeneration investment is justified to increase the likelihood of Douglas fir establishment, (ii) on less productive sites, low-cost regeneration options that produce mixed-species stands have expected present values close to or greater than a high-cost Douglas fir regeneration effort, (iii) optimal precommercial removal of red alder depends on mid-rotation prices and regeneration success, and in many cases growing a mixed-species stand to maturity produces the highest economic return, and (iv) commercial thinning of Douglas fir increases the expected present value of the most intensive regeneration option by up to 10%. The low-cost regeneration options have relatively high expected returns because of low initial investments and the presence of two species that may have high values in the future. The sensitivity of these results to changes in the probability distributions of regeneration success and price trends is discussed.

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5. Haight, R.G. 1993b. Technology change and the economics of silvicultural investment. Rocky-Mountain-Forest-and-Range-Experiment-Station,-USDA-Forest-Service General-Technical-Report RM-GTR-232. ii + 18 p.

Keywords: planting operations
site preparation
prescribed fire
release treatments
chemical release
tree/stand protection
thinning
commercial thinning
precommercial thinning
yield
economics

Abstract: Financial analyses of intensive and low-cost reforestation options are conducted for loblolly pine (*Pinus contorta*) stands with broadleaved competition in the Southern USA, and Douglas fir with red alder (*Pseudotsuga menziesii* with *Alnus rubra*) in the Pacific Northwest. Results show that the expected present values (EPVs) of low-cost options that result in mixtures of conifers and broadleaves are superior in some situations to the EPVs of the intensive options.

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6. Helgerson, O.T., D.H. McNabb and S.D. Hobbs. 1991. Survival and growth of Douglas-fir seedlings after prescribed burning of a brushfield in southwest Oregon. *Western-Journal-of-Applied-Forestry* 6(3): 55-59.

Keywords: site preparation
prescribed fire
tree/stand health
growth

Abstract: Five years after planting, survival of 2-0 bare root Douglas fir (*Pseudotsuga menziesii*) seedlings was high on both burned and unburned plots (89 and 87%, respectively), but seedling stem height, diameter, and volume were greater in burned than in unburned plots.

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7. Knapp, W.H., T.C. Turpin and J.H. Beuter. 1984. Vegetation control for Douglas-fir regeneration on the Siuslaw National forest: a decision analysis. *Journal-of-Forestry* 82(3): 168-173.

Keywords: planting operations
site preparation
chemical preparation
mechanical preparation
prescribed fire
release treatments
chemical release
manual release
growth
yield
economics

Abstract: Records from 324 plantations in Oregon were used to calculate the effect on stocking of various methods of controlling competing vegetation before and after plantation establishment. A decision tree analysis using 6 management regimes on 5 stocking classes indicated that if no site preparation or release (other than broadcast burning to reduce fuels) were practised, the forest would produce 63% of the m.a.i. and 35% of the present net worth (PNW) expected if all means of control (chemical, manual and burning) were available and used. If only manual control methods were used 78% of the max. m.a.i. and 57% of the max. PNW would be expected. When all methods except phenoxy herbicides were available, the expected m.a.i. and PNW were reduced to no less than 90%. The yield reduction varied with aspect, and the type of prelogging vegetation. Declines were least on SW-facing sites that were originally predominantly conifers, and greatest on NE-facing slopes that had supported broadleaves. Limitations of the analysis are discussed.

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8. Knowe, S.A., W.I. Stein and L.J. Shainsky. 1997. Predicting growth response of shrubs to clear-cutting and site preparation in coastal Oregon forests. *Canadian-Journal-of-Forest-Research* 27(2): 217-226.

Keywords: planting operations
site preparation
chemical preparation
mechanical preparation
prescribed fire
stand conditions

Abstract: Cover-projection models were developed based on algebraic difference formulations of an exponential-power function to describe shrub recovery and development patterns following clear cutting, site preparation and Douglas fir (*Pseudotsuga menziesii*) planting at 4 sites in the Siuslaw National Forest, Oregon. The sites formed part of the Coastal Site Preparation Study initiated in 1980, in which the effects were tested of 6 treatments on shrub growth patterns. Treatments were: none other than scalping a 30-cm spot when each 2-0 seedling was planted (control); spot clearing by cutting to 15 cm height all woody vegetation within a 1.2 m radius of the seedling; spraying with glyphosate (2.52 kg a.e./ha) in early autumn 1980; broadcasting burning slash in midsummer 1980; manually slashing all woody vegetation in June 1980 and broadcast burning later in the summer; and spraying with picloram + 2,4-D (Tordon 101) in May or June 1980 (at 1.49 + 5.97 kg a.e./ha) and broadcast burning in the summer. Results on the development of Douglas fir and associated vegetation to age 10 yr have already been reported for this study (Stein (1995) Research Paper - Pacific Northwest Research Station, USDA Forest Service, No. PNW-RP-473; Knowe & Stein (1995) *Canadian Journal of Forest Research* 25 (9) 1538-1547). The shrub cover-projection models were developed by incorporating indicator variables into the model rate and shape parameters for the recovery of 3 specific shrubs (salal, *Gaultheria shallon*; thimbleberry, *Rubus parviflorus*; and salmonberry, *Rubus spectabilis*), and all shrubs. For salal, the shape parameter included an adjustment for burning treatments that delayed maximum cover by several years in comparison with unburned treatments. The rate parameter in the thimbleberry model was adjusted for burning treatments; maximum cover occurred about 2 yr earlier in burned than in unburned treatments. Both rate and shape parameters in the salmonberry model were adjusted for burning treatments; delayed established but increased growth rate and less salmonberry cover are characteristic of burned treatments compared with the unburned treatments. The rate and shape parameters in the model for the shrub group included adjustments for burning treatments. Overstorey removal fostered shrub development, whereas site preparation treatments slowed and curtailed it. The final cover-projection models accounted for 68-92% of the total variation in cover, with the adjustments for burning accounting for 1.5-3.3% of the variation. The predicted growth patterns are consistent with trends in site occupancy and published autecological characteristics.

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9. McDonald, P.M. and G.O. Fiddler. 1993. Feasibility of alternatives to herbicides in young conifer plantations in California. *Canadian-Journal-of-Forest-Research* 23(10): 2015-2022.

Keywords: genetic tree improvement

site preparation
prescribed fire
release treatments
manual release
chemical release
growth
economics

Abstract: A research programme (involving 40 studies) was started in 1980 to compare the effectiveness and cost of various vegetation management techniques used for enhancing growth of 1- to 3-yr-old conifer (*Pseudotsuga menziesii*, *Pinus ponderosa*, *P. jeffreyi*, *Abiesmagnifica* and *A. concolor* var. *lowiana*) plantations in California. The studies were ended after 10 yr when competition became intraspecific. The techniques used included direct methods such as manual manipulation, mulching, herbicides (Garlon 3A [triclopyr], 2,4-D or Velpar [hexazinone]), and grazing for releasing conifer seedlings from undesirable vegetation, and several silvicultural practices (broadcast burning, group selection, genetically improved seedlings) that serve as indirect methods for reducing or avoiding vegetation problems. Manual release and mulching were effective but expensive. Herbicides were effective, applicable to almost all plant communities, and relatively inexpensive. Grazing was good for cattle and sheep, but did not significantly enhance conifer seedling growth. Silvicultural control of weeds was promising, but there was not enough information to evaluate feasibility. It was concluded that in most instances, forests cannot be managed economically without herbicides, if the objective is to grow seedlings at the potential of the site and the plant community includes sprouting broadleaves and shrubs or rhizomatous forbs and ferns. If the objective is to create a forest with several age-classes and variable structure, but with slower seedling growth, longer rotations, and less species diversity in early seral stages, then it is possible to accomplish this using other vegetation management techniques.

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10. Minore, D. 1986a. Effects of site preparation on seedling growth: a preliminary comparison of broadcast burning and pile burning. Pacific-Northwest-Research-Station,-USDA-Forest-Service Research-Note PNW-RN-452. 12 p.

Keywords: site preparation
prescribed fire
growth
soil properties

Abstract: In studies in SW Oregon, measured and potential heights were similar for 5-yr-old planted seedlings of Douglas fir (*Pseudotsuga menziesii*) on areas that had been broadcast burned. Measured heights were less than potential heights on most of the pile-and-burn plantations, suggesting that site quality is damaged by this site preparation method.

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11. Minore, D. and H.G. Weatherly. 1990. Effects of site preparation on Douglas-fir seedling growth and survival. *Western-Journal-of-Applied-Forestry* 5(2): 49-51.

Keywords: site preparation
mechanical preparation
prescribed fire
growth
tree/stand health
soil properties

Abstract: The effects of 5 site preparation treatment combinations (A: cable yarding + broadcast burning - B: tractor yarding + broadcast burning - C: machine piling + broadcast burning - D: machine piling + off-site burning - and E: machine piling + off-site burning + tilling) on Douglas fir (*Pseudotsuga menziesii*) growth and survival were studied in 1984-87. Seedling height, potential seedling height, survival percentages, soil-penetration resistances, and occurrence of visible soil humus were evaluated on 149 progeny-test plantations in western Oregon. Survival was not improved by mechanical site preparation (survival at 5 years was 84.8% for treatment A, 73.7% for C and 78.1% for E). Seedlings grown on compacted soils with low humus, associated with piling slash off site, did not grow as tall during their first 5 years as seedlings grown on similar sites where slash had been broadcast-burned (height 77 cm for treatments D and E, compared to 93 cm for A). Mechanical site preparation was not essential for Douglas fir survival, as long as competing vegetation is controlled. Increased soil compaction, loss of humus, and reduced 5 year height growth associated with mechanized slash removal indicated detrimental effects on site quality as well as tree growth.

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12. Newton, M., E.C. Cole and D.E. White. 1993. Tall planting stock for enhanced growth and domination of brush in the Douglas-fir region. *New-Forests* 7(2): 107-121.

Keywords: nursery operations
site preparation
prescribed fire
release treatments
chemical release
growth
tree/stand health

Abstract: Two long-term experiments in Oregon followed the development of planted stock of various sizes, origins, and species. In one experiment, multi-year comparisons of container, 2+0 bare rooted, and 3-yr-old Douglas fir (*Pseudotsuga menziesii*) transplants showed a strong positive relation between initial height and long-term (10-14 yr) growth under a range of site conditions with high probability of brush development. In another experiment, Douglas fir, western hemlock (*Tsuga heterophylla*), and Sitka spruce (*Picea sitchensis*) were planted on brushfield sites (disturbed by logging 0 and 4 yr previously) where salmonberry (*Rubus spectabilis*) was or had been dominant. Half the seedlings were released with glyphosate 6 months after planting. Western hemlock and Douglas fir bare rooted stock all grew well if planted in a fresh burn, despite rapid regrowth of salmonberry, but virtually all seedlings less than 60 cm tall except Sitka spruce were killed by 4-yr-old salmonberry if not released. Release

improved growth of seedlings in the fresh burn by 6%, gaining an average of about 0.6 year toward reaching a height of 6 m. Release improved growth of survivors in 4-yr-old salmonberry by 51% in height, 72% in diameter, and 325% in volume at age 12 yr. Sitka spruce grew well until damaged by insects. Western hemlock growth was equal to or greater than that of Douglas fir of comparable initial height. In all comparisons, the probability of being overtopped by brush decreased with increasing initial stock height, and the effect of suppression on growth was also inversely related to initial height. Tall wilding seedlings had comparable advantages to nursery-grown seedlings, although Sitka spruce survival was not reliable.

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13. Parke, J.L., R.G. Linderman and J.M. Trappe. 1983b. Effects of forest litter on mycorrhiza development and growth of Douglas-fir and western red cedar seedlings. *Canadian-Journal-of-Forest-Research* 13(4): 666-671.

Keywords: site preparation
mechanical preparation
prescribed fire
mycorrhizal response
growth

Abstract: Preparation of forest regeneration sites for conifer planting often includes slash burning or physical removal of soil organic matter. Experiments were conducted to determine if organic matter contributes to the mycorrhizal fungus inoculum potential in forest soils and to compare the growth of Douglas fir and western red cedar (*Thuja plicata*) in untreated or pasteurized soils from undisturbed or cleared and burned forest sites with and without addition of untreated or pasteurized litter. Mycorrhizas were abundant on Douglas fir seedlings grown in undisturbed forest soil but developed similarly on red cedar seedlings in either type of soil. Litter and humus were found to include inoculum of both vesicular-arbuscular (VA) and ectomycorrhizal fungi. Litter amendment usually enhanced growth of host seedlings, but growth enhancement could not be fully attributed to addition of mycorrhizal inoculum or nutrients provided by litter. These findings suggested that other biological factors stimulated the growth of conifer seedlings and (or) activity of mycorrhizal fungi.

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14. Piatek, K.B., C.A. Harrington and D.S. DeBell. 2003. Site preparation effects on 20 year survival and growth of Douglas-fir (*Pseudotsuga menziesii*) and on selected soil properties. *Western-Journal-of-Applied-Forestry* 18(1): 44-51.

Keywords: site preparation
mechanical preparation
prescribed fire
tree/stand health
growth
soil properties

Abstract: Long-term effects of site preparation on tree performance and soil properties are not well known. Five site preparation treatments were evaluated to determine how they affected survival and growth of Douglas-fir (*Pinus menziesii*) 3, 10, and 20 years after planting, and soil bulk density, C, N, P, and organic matter concentrations at 0 to 20 cm soil depth 21 years after planting. The site preparation treatments were imposed following logging of three harvest units of old-growth forest on a volcanic soil in southwestern Washington, USA; the units were logged to leave 17, 38, and 53 tonnes/ha of woody residue. The site preparation treatments were hand-pile-and-burn, machine-pile-and-burn, scarification, broadcast burn, and control. Mean survival ranged from 86% at age 3 to 70% at age 20, and average tree heights at 3, 10, and 20 years were 0.6, 4.1, and 11.7 m. The scarification treatment had the best growth; at age 20, its average tree was 21% taller, 26% larger in diameter, and 82% greater in volume than the control. The hand-pile-and-burn treatment did not differ from the control in tree growth; the machine-pile-and-burn and broadcast burn treatments were intermediate in their growth response. Average soil bulk density was 0.74 g/cm³, organic matter concentration was 118 g/kg, and C, N, and P concentrations were 49, 1.6, and 0.7 g/kg with no significant treatment effects. Site preparation may have benefited growth of the trees on these units by decreasing competition from invading and regrowing vegetation, increasing nutrient availability, or increasing soil temperature.

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15. Pilz, D.P. and D.A. Perry. 1984. Impact of clearcutting and slash burning on ectomycorrhizal associations of Douglas-fir seedlings. *Canadian-Journal-of-Forest-Research* 14(1): 94-100.

Keywords: site preparation
prescribed fire
mycorrhizal response

Abstract: The results of field and greenhouse studies. Twelve ectomycorrhizal types were found in 3 western Cascade Mountain sites in Oregon on seedlings planted in soils on burned and unburned portions of clear felled areas and on undisturbed forest. *Rhizopogon* sp. and an unidentified brown type consistently formed at least two-thirds of the ectomycorrhizal root tips. Regardless of soil origin, more ectomycorrhizae formed in clear-felled areas than in undisturbed forest (primarily due to more brown mycorrhizae). Soil origin did not affect total numbers of ectomycorrhizae; however, more different types formed in undisturbed forest soils than in clear-felled soils, irrespective of aboveground environment. More nonmycorrhizal tips occurred in clear-felled soils. Seedlings grown in the same soils formed the same proportions of *Rhizopogon* and brown types in field and greenhouse, but not the same proportions of less common ectomycorrhizal types. Soil pasteurization increased root-tip numbers. Inoculated soils (1 part nonpasteurized: 9 parts pasteurized) produced as many ectomycorrhizae as nonpasteurized field soils and generally fewer tips than pasteurized soils. Formation of major (but not minor) ectomycorrhizal types on all sites was influenced more by aboveground changes that accompany clear felling and site preparation than by alterations in soil chemistry or biology.

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16. Schneider, W.G., S.A. Knowe and T.B. Harrington. 1998. Predicting survival of planted Douglas-fir and ponderosa pine seedlings on dry, low-elevation sites in southwestern Oregon. *New-Forests* 15(2): 139-159.

Keywords: site preparation
mechanical preparation
prescribed fire
tree/stand health
tree morphology
stand conditions

Abstract: Four equations were developed by logistic regression for predicting the probability of Douglas fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*) survival for the first (0-1) and first to third (1-3) growing seasons after applying mulching, radial scalping (removal of all vegetation and a thin layer of soil in a 1-m radius area around each tree), or artificial shading (shade cards) treatments in plantations in SW Oregon. Most of the sites had been burned by wildfire or prescribed fire before planting. Variables describing conifer size, levels of competing vegetation, presence of silvicultural treatments, site factors, and climate factors were collected from 13 sites up to 6 yr after planting and examined as potential predictors of survival. Age, stem diameter, a competition index for shrubs, severity of growing season at time of treatment, average annual precipitation, aspect, and slope angle were predictors of Douglas fir survival during 0-1 and 1-3 growing seasons after treatment; the presence of silvicultural treatments was also a predictor only during the first growing season after treatment. Age, aspect, and slope angle were predictors of ponderosa pine survival over both 0-1 and 1-3 growing seasons after treatment; height-diameter ratio, competition indices for herbs, shrubs, and hardwoods, silvicultural treatment, severity of growing season at time of treatment, and average annual precipitation were also predictors only during the first growing season after treatment; crown width was a predictor of survival only during 1-3 growing seasons after treatment. When significant in the models (equations), predicted probability of survival increases with treatments, less severe weather conditions, diameter, crown width, age, and precipitation; probability decreases with increasing height-diameter ratio and competition indices for herbs, shrubs, and hardwoods.

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17. Stein, W.I. 1997. Ten-year survival and growth of planted Douglas-fir and western redcedar after seven site-preparation treatments. *Western-Journal-of-Applied-Forestry* 12(3): 74-80.

Keywords: site preparation
chemical preparation
prescribed fire
tree/stand protection
growth
tree/stand health
stand conditions

Abstract: Western redcedar (*Thuja plicata*) and Douglas fir (*Pseudotsuga menziesii*) were planted together after applying seven site-preparation methods at one cable-logged site in the Oregon Coast Ranges. The treatments, applied during 1980, were: untreated control; spot clear by cutting; aerial

spraying with glyphosate; broadcast burning; slash and burn; spray with Tordon 101 (picloram + 2,4-D) and burn; and burn and sow grass. Planting was done in early 1991, and vegetation and trees were measured periodically to 1990. Survival and growth of cedar were markedly less than Douglas fir on this favourable site where both species were components of the original stand. Repeated browsing severely impeded the cedar. Site preparation by broadcast burning generally yielded the best results, but sowing grass after broadcast burning produced Douglas fir responses similar to those for no site preparation. Where grass was sown, herbaceous cover was more abundant and taller, salmonberry (*Rubus spectabilis*) differed little in density but was slightly taller, and development of red alder (*Alnus rubra*) was delayed. Red alder is currently overtopping conifers in all treatments, and release is needed to ensure sufficient conifer survival.

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18. Vihnanek, R.E. 1987. The effects of prescribed burning on the growth and nutrition of young Douglas-fir plantations in some salal [*Gaultheria shallon*]-dominated ecosystems [in British Columbia, Canada]. *Forestry-Abstracts* 48(11): 641.

Keywords: site preparation
prescribed fire
growth
tree physiology

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19. Vihnanek, R.E. and T.M. Ballard. 1988. Slashburning effects on stocking, growth, and nutrition of young Douglas-fir plantations in salal-dominated ecosystems of eastern Vancouver Island. *Canadian-Journal-of-Forest-Research* 18(6): 718-722.

Keywords: site preparation
prescribed fire
growth
tree physiology
stand conditions

Abstract: Stocking, ht. growth, basal diam. growth, and foliar nutrient concn. of 5- to 15-yr-old Douglas fir (*Pseudotsuga menziesii*) were evaluated on burned and unburned areas within each of 20 sites on eastern Vancouver Island, which were characterized by ecosystems dominated by salal (*Gaultheria shallon*). Burning significantly reduced salal ht. and cover and significantly increased Douglas fir stocking, ht. growth, basal diam. and foliar P, K, Ca, Fe, and B concn. Foliar concn. of N, Mg, S, Zn and Cu were not significantly affected. Foliar Mn concn. were significantly reduced but remained very far above the deficiency threshold.

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20. Wagner, R.G. and S.R. Radosevich. 1991a. Interspecific competition and other factors influencing the performance of Douglas-fir saplings in the Oregon Coast Range. *Canadian-Journal-of-Forest-Research* 21(6): 829-835.

Keywords: site preparation
prescribed fire
growth
tree morphology

Abstract: Regression models describing total height, stem diameter, stem volume index, and crown volume index of individual 4- to 9-year-old saplings of Douglas fir (*Pseudotsuga menziesii*) were developed from a retrospective analysis of two site preparation experiments (with/without prescribed burning). Measurements of 787 Douglas fir saplings were taken at nine sites during July and August 1984. The variables included in the models were age, interspecific competition index, height, animal damage (browsing and clipping), use of prescribed burning, and slope angle and azimuth. The models, which integrate environmental and morphological factors that can influence the performance of Douglas fir saplings into one set of equations, accounted for 64-73% of the variation in individual tree size. Interspecific competition and amount of animal damage were negatively correlated with tree size. Tree age, 1st-year height, and the use of prescribed burning were positively correlated with tree size. When factors were held constant, trees were largest on steep southeast slopes. The models indicated that tree age, competing vegetation, animal damage, and initial seedling size had a dominant influence on the performance of Douglas fir saplings, while prescribed burning and topography were of relatively minor importance.

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